

L 0010-00

ACC NR: AT6015139

influence of the radiant energy arising in the resonator as a result of stimulated de-excitation of δn excited atoms of the active medium accumulated in the initial period of generation. Depending on δn and r , one of two possibilities is realized: either a small part or the entire stored excess of luminescence centers is de-excited. The formulas are extended over the 3-level laser case. Orig. art. has: 3 figures and 80 formulas.

SUB CODE: 20 / SUBM DATE: 12Feb66 / ORIG REF: 007 / OTH REF: 003

Card 2/2 ^v

L 01055-67 EWT(1)/EFC(k)-2/T/EWP (k) IJP(c) WG/GD

ACC NR: AT6015136

SOURCE CODE: UR/0000/66/000/000/0137/0143

AUTHOR: Ratner, A. M.; Rom-Krichevskaya, I. A.; Tiunov, Yu. A.

59
B+1

ORG: Physico-Technical Institute of Low Temperatures, AN UkrSSR (Fiziko-tekhnicheskii institut nizkikh temperatur AN UkrSSR)

TITLE: Separate intensity peaks in laser radiation

SOURCE: Respublikanskiy seminar po kvantovoy elektronike. Kvantovaya elektronika (Quantum electronics); trudy seminara. Kiev, Naukova dumka, 1966, 137-143

TOPIC TAGS: laser, laser theory, solid state laser

ABSTRACT: An integral equation describing high-intensity variations of laser radiation is analyzed; the number of excited centers of luminescence increases with pumping and decreases due to de-excitation by luminous energy. With large reflector-misalignment angles, the light energy generated in a given peak does not last until the next peak; hence, each peak is formed separately. The distinguishing features of the separate peaks are: (1) They are sharper than conventional oscillations; (2) They have a longer period; (3) They are regular; (4) No damping occurs with a continuous

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pumping; (5) The time of generated radiation does not exceed the period; this time determines the radiation spectrum; (6) Separate peaks are less polarized, and their polarization is independent of the peak number; (7) The generated energy is smaller in the case of separate peaks. A specimen of Nd glass 150-mm long and 14-mm diameter was used in an experimental study of the separate peaks; the mirror-axes misalignment was 2 angular minutes; oscillograms exhibit some changes in the generation pattern. Orig. art. has: 2 figures and 16 formulas.

SUB CODE: 20 / SUBM DATE: 12Feb66 / ORIG REF: 001 / OTH REF: 002

all in
Card 2/2

BONDARENKO, N.A., inzh.; RATNER, A.M., inzh.; SOKOLOV, K.A., inzh.; GUBANOV, N.P., inzh.; SORIN, N.M., inzh.; TARAKANOV, G.P., inzh.; IVANOV, S.M., inzh.; NIK, A.D., inzh.; ROVKAKH, S.Ye., kand.tekhn.nauk; FILIPPOV, V.V., inzh.; KHAYKIS, L.B., kand.tekhn.nauk; LEBEDEV, V.I., inzh.; VELICHKIN, Ye.A., inzh., red.; KHITROV, P.A., tekhn.red.

[Handbook for machinery operators of construction areas] Spravochnik mekhanika stroitel'nogo uchastka. Moskva, Vses.izdatel'sko-poligr. ob"edinenie M-va putei soobshcheniia, 1960. 619 p.

(MIRA 14:1)

(Building machinery--Maintenance and repair)

GORELIX, B.M.; RATNER, A.V.

Means for increasing the output of molded articles from vulcanisation presses. Kauch. i rez. no.1:36-42 Ja '57. (MLRA 10-4)

(Rubber industry--Equipment and supplies)
(Vulcanisation)

Andriy, L. V.

Cand. Tech. Sci.

Dissertation: "Temperature Stresses in the Elements of Steam Boiler." All-Union Order of the Labor Red Banner Heat Engineering Inst under F. E. Dzerzhinskiy, 24 Sep 47.

SC: Vechernyaya Moskva, Sep, 1947 (Project #17836)

RATNER, A. W.

1741

USSR/Steam Boilers

Mar 1947

"The Calculation of Strength of Steam Boiler Drums
and Cylindrical Collectors," A W Ratner, 5 pp

"Izv Vses Teplotekh Inst" No 3

An analysis of existing formulae for calculating
the strength coefficients of the crosspieces between
the slots and the drums and the collectors, and a re-
commendation of a rational formula for determining
these coefficients on the basis of the investigations
of Zibel and Konf.

1741

RATNER, A. V.

Packing (Mechanical Engineering)

Stuffing box packing of high pressure shutting-off equipment, Rab. energ., 1, No.1, 1952

Monthly List of Russian Accessions, Library of Congress, October 1952. UNCLASSIFIED

AKOL'ZIN, P.A., kandidat tekhnicheskikh nauk; RATNER, A.V., kandidat tekhnicheskikh nauk.

Intercrystalline corrosion of the metal of drums and tubes of high-pressure steam boilers. Elek.sta. 25 no.1:6-10 Ja '54.

(MLRA 7:1)

(Corrosion and anticorrosives) (Steam boilers)

ВНЕШ. А. А.

MOISEYEV, A.D., inzhener; RATNER, A.V., kandidat tekhnicheskikh nauk.

Improved reliability of the sealing mechanism in high pressure slide valves with a self-locking device. Elek.sta. 25 no.5:3-6 Ny '54. (MLRA 7:6)
(Slide valves)

RATNER, A. V.

1876. INTERCRYSTALLINE CORROSION OF HIGH PRESSURE BOILER DRUMS AND TUBES.
Akolzin, P. A. and Ratner, A. V. (Elekt. Sta. (Pwr Sta., Moscow), Jan. 1954,
vol. 25, 6-10). Two methods of reducing the alkalinity of boiler water are
discussed, (a) complete neutralization of the sulphuric acid by chemically purified
water and (b) H-Ni cation treatment providing chemically purified water practically
devoid of alkali. Both processes also raise the sulphate concentration, the
positive action of which on boiler metal averts the formation of intercrystalline
cracks.

B.E.A.

Ratner, A. V.

AID P - 2872

Subject : USSR/Engineering

Card 1/2 Pub. 110-a - 5/16

Authors : Ratner, A. V., Kand. Tech. Sci., and Zelenskiy, V. G.,
Eng.

Title : Experiments and first test run of superhigh steam
equipment

Periodical : Teploenergetika, 10, 26-33, 0 1955

Abstract : The article describes tests used for equipment for
superhigh steam characteristics manufactured by the
Venyukovskiy Electrical Equipment Plant. Tests with
valves (180-200 atm, 360° C, saturated steam) and
their design and operation are given in great detail.
The authors mention that for the first 2,000 hrs of
operation the unit is to be considered as still in
the testing period. Some recommendations for
improvement in the design of valves are made. Eight
diagrams.

RATNER, A.V.

KONTOROVSKIY, A.Z., inzhener; RATNER, A.V., kandidat tekhnicheskikh nauk.

Observing the condition of metal of high-pressure pipe lines.
Elek. sta. 26 no.1:50-52 Ja '55. (MIRA 8:3)
(Steam power plants)(Pipe, Steel)

IMBRITSKIY, M. I. (Engr.) and RATNER, A. V. (Cand.Tech.Sci.)

"Damage to Fittings and Ways of Enhancing their Reliability by Improved Design."

A Scientific-Technical Conference on Auxiliary Equipment for Power Station Boiler Houses.

Moscow, 17 - 20 Dec 1957.

Teploenergetika, 1958, No. 4, pp. 90-91 (USSR)

8(6)

SOV/112-59-2-2517

Translation from: Referativnyy zhurnal. Elektrotekhnika, 1959, Nr 2, p 34 (USSR)

AUTHOR: Akol'zin, P. A., and Ratner, A. V.

TITLE: Transcrystallite Corrosion of Metal in High-Pressure Boiler Drums and Tubes (Mezhkristallitnaya korroziya metalla barabanov i trub kotlov vysokogo davleniya)

PERIODICAL: V sb.: Vnutrikotloviye fiz.-khim. protsessy, vodopodgotovka i vodn. rezhim kotlov na elektrost. vysokikh i sverkhvysokikh parametrov. M., AS USSR, 1957, pp 384-395

ABSTRACT: An instrument is described which is used for investigating trans-crystallite corrosion of metal subjected to pressures of over 100 atm. The instrument is equipped with chlorine-silver and nickel electrodes for electrochemical measurements. Ten such instruments were placed in an air thermostat at 320°C; a pressure of 100 atm was created inside the samples and a stress of about 25 kg/mm² was set up in the weakened part of the sample.

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SOV/112-59-2-2517

Transcrystallite Corrosion of Metal in High-Pressure Boiler Drums and Tubes

The aggressiveness of the medium was evaluated by the time required for flaw formation in the sample neck. This action was compared with the sample behavior in a certainly noncorrosive distillate. Effect of the density of polarizing (anodic or cathodic) current on the time of flaw formation is explained. The influence of niter and other salts as well as some organic substances upon the above process was studied. An analysis of cases of transcrystallite corrosion of high-pressure boilers is presented. An inference is drawn that the transcrystallite corrosion is more severe in high-pressure boilers than in medium-pressure; flaws are also formed in the drum body when the boiler water has a low alkalinity (3.5 mg-equiv/liter). Methods of controlling the transcrystallite corrosion are recommended: elimination of high stresses, nitrate treatment (up to 70 atm gauge), and phosphate-alkaline purity of boiler water.

A. P. M.

Card 2/2

628

AUTHOR: Ratner, A.V. (Cand. Tech.Sci.)
 TITLE: The stability of metals against scoring. (Stoykost' metallov protiv zadiraniya).
 PERIODICAL: "Teploenergetika" (Thermal Power), Vol.4, No.5, May, 1957, pp.30-35 (U.S.S.R.)

ABSTRACT: The main problem in developing reliable fittings for high-pressure steam is the selection of material for valves and rubbing parts. These parts are subject to scoring, that is, to specific damage of the contacting surfaces occurring whilst the parts are rubbed together under load. Scoring may be reduced by good design of fittings and by making them of materials that are resistant to scoring. Little information is at present available about permissible specific pressures on dry friction. The mechanism of scoring under dry friction is considered and an expression is given for the contact area between parts based on Bowden's work. A formula is then derived for the specific pressure in terms of the pressure that causes scoring to a depth of 1 micron with a friction path of 1 m, the depth of scoring and the length of friction path. The formula shows that for valves with conical seatings considerably greater specific pressures can be used than in gate valves assuming the same surface inequalities in both cases. In order for scoring to occur there must be contact

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The stability of metals against scoring. (Cont.) 628
between clean metallic surfaces within the range of action of interatomic forces. This is hindered by a layer of adsorbed substances and layers of oxides, nitrides, carbides, etc. on the metal surface. For seizure to occur these substances must either be removed from the surface or dissolved in the metal. Therefore, the mechanical properties of the films on the surface of bodies are of great importance.

The article describes tests on scoring carried out in air at a temperature of 20 to 30°C and in steam at a pressure of 25 atms and a temperature of 385 to 400°C on a special oscillatory machine. The mean rate of travel of the specimen was 0.69 cm/sec, the length of travel was 20 mm. Axial load was applied by an oil servo-motor. The surfaces were polished before use and their roughness measured. After testing measurements were made of the contact area of friction and the depth of scoring using a microscope or micro-interferometer. The hardness of the specimens was measured on the Vickers scale and the micro-hardness to a depth of 2 to 5 microns on the instrument of Krushchev and Berkovich. Information is tabulated about the chemical composition and heat treatment of the steel and hard alloys tested. The test results are presented in the form of graphs of load

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220
The stability of metals against scoring. (Cont.)

against scoring. There is a considerable scatter of results for any given metal. Therefore, reasonable safety factors must be used in design. Information is given about the relative surface hardening of the metal, the greater the increase in hardness the less the specific pressure which the metal can withstand and vice versa. Here again there was some scatter of results. However, a relationship was established between the specific pressure that causes scoring during dry friction and the relative increase in surface hardness, and, therefore, it is possible to determine the stability of the metal against scoring from measurements of its hardness at the surface and in depth. This result can be used to develop steels resistant to scoring. It would be advisable to make further tests on the scoring of steels after they had been held for a long time at the working temperature or above. Test results show that during dry friction of two different metals scoring is governed by the metal which is of the least stability. In this case the metal with the greatest tendency to scoring usually adheres to the metal having a smaller tendency. For the metals tested there is little difference in resistance to scoring at room temperature and at 400°C. 8 figures, 7 literature references (4 Russian).

Card 3/3

RATNER, A.V., kandidat tekhnicheskikh nauk.

Investigation of the effect of variable thermal stresses on the durability of steels [with summary in English]. Teploenergetika 4 no.10:73-77 0 '57. (MLRA 10:9)

1. Vsesoyuznyy teplotekhnicheskii institut.
(Steel--Testing)

KATAL, I.V.
RATNER, A.V., kand.tekhn.nauk.

Thermal fatigue test for pipes made of 15M steel.
Teploenergetika 4 no.11:78-81 M '57.
(Pipe, Steel--Testing)

(MIRA 10:10)

RATNER, A.V., kand. tekhn. nauk; ZELENSKIY, V.G., inzh.

Erosive wear of packings for water and steam fittings. Teploenergetika
4 no.12:28-32 B '57. (MLBA 10:11)

1. Vsesoyuznyy teplotekhnicheskiy institut.
(Boilers--Valves)

ZELINSKIY, V.G., inzhener; RATNER, A.V., kandidat tekhnicheskikh nauk.

Self sealing washers and shut-off devices for fittings. Elek.
sta. 28 no.5:20-22 My '57. (MIRA 10:6)
(Boilers--Safety appliances)

RATNER, A.V.

RATNER, A.V., kand.tekhn.nauk

Using regulating feed valves for high and superhigh pressure.
Elek.sta. 28 no.10:18-21 '57. (MIRA 10:11)
(Boilers--Safety appliances)

KUTNER, N.V.

(18)7 P 3.

PHASE I BOOK EXPLOITATION

SOV/1978

ORGRES, trust, Moscow, Byuro tekhnicheskoy informatsii

Metall v sovremennykh energoustanovkakh (Metals in Modern Power Plants) Moscow, Gosenergoizdat, 1958. 75 p. 4,150 copies printed.

Eds.: M.S. Aronovich, Candidate of Technical Sciences, I.K. Korikovskiy; Tech. Ed.: G.Ye. Larionov.

PURPOSE: This collection of articles is intended for designers and process engineers in plants building machinery for power stations.

COVERAGE: Materials for these articles were compiled from investigations carried out at the Otdeleniye metallov Vsesoyuznogo teplo-tekhnicheskogo nauchno-issledovatel'skogo instituta imeni F.E. Dzerzhinskogo (Department for Metals of the All-Union Heat Engineering Scientific Research Institute imeni F.E. Dzerzhinskiy) from 1950-1955. The following staff members of the Department for

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Metals in Modern Power Plants

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Metals VTI participated in the research: D.N. Vidman, R.Ye. Mazel', V.F. Zlepko, A.I. Zakhanova, V.G. Zelenskiy, L.G. Leonova, Engineers; A.I. Sekt, V.N. Gulyayev, Junior scientific workers; L.A. Ilyutina, Ye.P. Denisova, L.Ye. Kornilova, Senior technicians. The behavior of steel used for building machinery and accessories for modern heat power plants with high and superhigh pressure is described and discussed. There are no references.

TABLE OF CONTENTS:

Foreword

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Laguntsov, I.N., and A.Z. Kontorovskiy, Candidates of Technical Sciences. Changes in the Structure and Properties of Steel in Equipment of Heat Power Plants During Service

5

Changes in the properties of steel depending on initial structure and on degree of spheroidization of pearlite are discussed. The effect of pressure, temperature, time, and stress is also considered.

Laguntsov, I.N., P.M. Gura, Candidates of Technical Sciences; and T.A. Mikhaylova, Engineer. Behavior of Austenitic Steel 1kh14N14V2M (EI257) in Modern Heat Power Plants

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Metals in Modern Power Plants

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The steel under discussion belongs to the group of chromium-nickel heat-resistant steels with addition of tungsten and molybdenum. Its composition and properties are presented and the behavior of this steel in two steam power plants is described. No damage was found in walls 17 to 18 mm. thick; in walls 32-38 mm. thick ring-type cracks were found

Ratner, A.V., Candidate of Technical Sciences. Metal for Accessories of Heat Power Plants of High and Superhigh Pressure 54
The author discusses the usefulness of materials, mainly steels, for making parts of pipe fittings, valves, etc. Mechanical wear and erosion cavitation of parts, joining to piping, depositing carbide alloys on sealing surfaces, proposals for improving parts, and increasing the reliability of accessories are covered.

AVAILABLE: Library of Congress (TA473.07)

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7-27-59

SOV/96-58-5-8/27

The Determination of the Wetness of Steam at High Pressures

the tube.

The equipment and its calibration are described. The steam content of the wet steam was determined from the heat-balances of the steam cooler and the small heat-exchanger. The experimental procedure and precautions are then described. The difference between the steam contents determined from the heat balance of the steam cooler and from the measurement heat exchanger was usually ± 0.05 . Various formulae used in working out the results are given, including one for the specific gravity of the steam/water mixture and one for the pressure drop on the measuring tube.

The results of tests on the Venturi tube are tabulated. The flow coefficient was 0.99 for cold and hot water and also for super-heated steam. The tests on wet steam gave considerable scatter of experimental points but here again the mean flow coefficient was 0.99. Since this coefficient was the same for all the conditions tested, it is possible, given the flow at sections where the fluid is of single phase, to use the flow

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SOV/96-58-5-8/27
The Determination of the Wetness of Steam at High Pressures

measuring tube to determine the steam wetness. This is very important in adjusting and operating direct-flow boilers and other high-pressure equipment. A convenient graphical method of determining the steam wetness is described. There are 2 figures, 1 table and 2 Soviet references.

ASSOCIATION: VTI

Card 3/3

1. Steam--Moisture factors
2. Steam--Physical properties
3. Water--Determination

SOV/96-58-9-15/21

AUTHORS: Ratnor, A.V. (Candidate of Technical Science) and
Leonova, L.G. (Engineer)

TITLE: The Possibility of Using Hard Alloys TsN-2, TsN-3 and
TK-4 for Sealing Surfaces of Steam Fittings working at
High Temperatures (O vozmozhnosti primeneniya tverdykh
splavov TsN-2, TsN-3 i TK-4 dlya uplotnitel'nykh
poverkhnostey parovoy armatury, rabotayushchey pri
vysokikh temperaturakh)

PERIODICAL: Teploenergetika, 1958, Nr 9, pp 70 - 74 (USSR)

ABSTRACT: The sealing surfaces of high-temperature fittings have to
meet very strict requirements. The stellite alloys
(TsN-2) now used are based on cobalt, which is scarce and
expensive; substitutes are desirable. This article
describes work done to investigate the possibility of
using stellite TsN-2, sormite grade TsN-3 and alloy TK-4.
Details are given of the steels on which these alloys were
deposited, the thickness of the basic steel and of the
deposit, the chemical analysis of the electrodes and
electrode coatings, and the welding conditions. The
electrode analyses are recorded in Tables 1 and 2. It

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The Possibility of using Hard Alloys TsN-2, TsN-3 and TK-4 for Sealing Surfaces of Steam Fittings working at High Temperatures

will be seen that TsN-3 differs from TsN-2 in containing 5-7% Ni and 1.5 - 3% Mn and no cobalt or tungsten. Both alloys contain 28 - 32% chromium. TK-4 is a chrome-nickel steel with a little manganese. Photo-micrographs of the structures of the three alloys are shown in Figs 1, 2 and 3. The structure of alloy TsN-2 after 9,500 hours ageing at 650°C is given in Fig 5 and it will be seen that it has changed somewhat; the carbides have coagulated and the dendritic structure has disappeared. Alloy TsN-3 changed very little after similar ageing, as will be seen from Fig 6. The graph, Fig 7, shows that from 5,000 - 9,500 hours ageing at 650°C the hardness of the two alloys is stable. Table 5 gives the results of scratch tests on alloys TK-4 and TK-4B. Similar data for TsN-2, TsN-3 and TK-4 in the initial conditions and after 5,000 hours ageing are given in Fig 10. The tests show that alloy TsN-2 has better resistance to scoring than alloy TsN-3. Tests made on stop-valves at 140 atmospheres and 570°C with alloys TsN-2 and TsN-3 on perlite steel showed that TsN-2 was satisfactory whilst TsN-3 was

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The Possibility of using Hard Alloys TsN-2, TsN-3 and TK-4 for Sealing Surfaces of Steam Fittings working at High Temperatures

not. The reason may be that, of the two alloys, TsN-3 has a coefficient of expansion nearer to that of the base metal. It is concluded that it is inadvisable to use alloy TsN-3 in high-temperature fittings for steam temperatures greater than 560°C, and that alloys TK-4 and TsN-2 may be used for this purpose. However, if the working surfaces do not slide on one another TsN-3 can be used at temperatures up to 570°C.

There are 10 figures, 5 tables, 4 literature references (3 Soviet, 1 German)

ASSOCIATION: Vsesoyuznyy teplotekhnicheskiy institut (All-Union Thermo-Technical Institute)

1. Steam pipes--Test results
2. Pipe fittings--Applications
3. Steel--Properties
4. Electrode coatings--Applications

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SOV/95-58-11-15/21

AUTHOR: ~~Ratner, A.V.~~, Candidate of Technical Science
Lobl, K., Candidate of Technical Science
Cherny, F., Engineer

TITLE: Testing Czechoslovak Steam Valves at a Temperature of 570°C. and a Pressure of 140 atm (Ispytaniya Chekhoslovatskikh parovykh zadvizhek pri temperature 570°C i davlenii 140 ati)

PERIODICAL: Teploenergetika, 1958, Nr 11, pp 81-84 (USSR)

ABSTRACT: In the first power stations operating with very high steam conditions, steam-valves gave rise to a number of difficulties mainly resulting from erosion. Many laboratory tests have been made to compare materials in respect of their resistance to erosion. However, the most reliable results are obtained by testing actual steam valves made with the different materials to be compared. With this end in view, the Fittings Laboratory of the All-Union Thermo-Technical Institute tested Czechoslovak high-pressure steam valves. Tests were made on four valves 150 mm diameter for a rated pressure of 250 atm. The main object was to compare cobalt stellites Real-095

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Testing Czechoslovak Steam Valves at a Temperature of 570°C
and a Pressure of 140 atm

and Real-096. Tests were also made on similar valves for a rated pressure of 160 atm faced with hard alloys of lower cobalt content, manufactured by melting turnings. Chemical analyses of the alloys used are given in Table 1. and their micro-structures are reproduced in Fig.1-4. The valves tested, illustrated in Fig.5. had a cast-iron body; the construction is described and the materials used for the main parts of the valves stated in Table 2 with their chemical analyses. The steam conditions used in the tests were higher than the Czechoslovak standard values for the material of which the valve body was made. The tests were made by gradually increasing the pressure drop across the valve after each test cycle, which comprised 15 openings and closings. The drives used on the valves are described, also the test procedure. The test results are given in Tables 3 and 4 which include visual

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SOV/96-58-11-15/21

Testing Czechoslovak Steam Valves at a Temperature of 570°C.
and a Pressure of 140 atm

observations of the parts of the valves. Comments are made on the valve construction. It is concluded that in respect of resistance to erosion by steam at a pressure of 140 atm and temperature of 570°C stellite Real-096 is the best. Alloy Real-095 is not suitable for use in valves under these conditions. Of the two alloys tested at 550°C and intended for use at 500°C, the most stable is alloy 1508CoB with a cobalt content of about 10%, which is better than the other alloy with a cobalt content of about 30%. The tests confirmed that Czechoslovak valves type MSChKD have adequate reserve strength and operate satisfactorily with pressure 40% above and turning moment double the rated values and also at higher than rated temperature. Because the cover is fitted to the body without a flange these valves

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SOV/96-58-11-15/21

Testing Czechoslovak Steam Valves at a Temperature of 570°C.
and a Pressure of 140 atm

are lighter than the usual type but further
development is required so that the valve can be
dismantled readily without damage. There are
7 figures, 4 tables and 4 **Soviet** references.

Card 4/4

RATNER, A. V.

AUTHORS: Gulyayev, V. N., Ratner, A. V.

31-2-12, '60

TITLE: Devices for Testing Metals for Their Resistance
Under Working Conditions (Prisposobleniya dlya ispytaniya
metallov na dlitel'nyuyu prochnost' v rabochikh sredakh)

PERIODICAL: Zavodskaya Laboratoriya. 1958, Vol. 24, Nr 2, pp. 226-229
(USSR)

ABSTRACT: As some metal parts are often exposed to the influence of
some hundred atmospheres and to high temperatures a
testing method was developed that makes it possible to
investigate the resistance at 300 to 500 atmospheres and at
650° to 700°C. Two arrangements (which can be adapted to
the machine M-2) for the determination of the corrosion
resistance duration are described. In the first arrangement
the cylindric test sample is fastened to the holders of the
machine M-2 in a furnace as can be seen in the figure.
Another furnace contains an ampoule which is filled with a
condensate before the test. The ampoule and the test sample
are connected by a tube (with pressure gauge). Before the
test begins the tube is rolled up. By the heating of the

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Devices for Testing Metals for Their Resistance
Under Working Conditions

32-2-42/65

furnaces and by the vaporization of the condensate, both, temperature and pressure are increased. The second arrangement, proposed by A. V. Ratner, shows in its schematic representation that the test sample can be deformed perturbation-free when the corrosion resistance duration is investigated. The tension is calculated in the tests according to a given formula. With both test arrangements it is possible to use other substances instead of the condensate. The construction material for both devices is heat-resisting stainless steel. There are 2 figures and 4 references, all of which are Slavic.

ASSOCIATION: All-Union Scientific Thermotechnical Research Institute
imeni F. E. Dzerzhinskiy (Vsesoyuznyy teplotekhnicheskiiy
nauchno-issledovatel'skiy institut imeni F. E. Dzerzhinskogo)

AVAILABLE: Library of Congress

1. Corrosion resistant alloys-Test methods

Card 2/2

32-24-6-35/44

AUTHORS: Ratner, A. V., Gulyayev, V. N.

TITLE: On Testing Armature Materials With Respect to Their Resistivity to Wear (Ob ispytaniyakh armaturnykh materialov na soprotivleniye zadiraniyu)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol 24, Nr 6, pp 770-774 (USSR)

ABSTRACT: The present paper describes some characteristics of test methods as well as the machines used. The material of the connection pieces influences the resistance to wear of the friction surface, and to do the conditions of friction; in this way the existing test machines differ also by the shape of their friction surfaces, by the temperature of testing, by the type of the working medium, by the number of samples simultaneously subjected to friction, by the conditions of gliding and by the kind of drive. In tests in a vapor medium the function of the resistance to wear can be represented by an equation as a function of the friction surface and the depth of wear. The resistance to wear is

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On Testing Armature Materials With Respect to Their Resistivity to Wear

usually determined by measuring the contact friction surface and the depth of wear, a double microscope according to Linnik MIS-11 or a microinterferometer MII-5 being used. The samples used for the tests must be thermally stabilized and their surface must be polished and cleared. In order to take into account the deviation of the measurement data a certain safety factor must be assumed in the selection of the permissible specific pressure brought to bear upon the friction surfaces. The apparatus produced by Scheffer and Budenberg is schematically shown and described, as well as parts of machines for tests carried out in a vapor medium with a horizontal axis and a forward motion of the sample by means of a table containing data on the tests at high temperatures. Among other things it is mentioned that additional tests of the friction parts of the test samples of the armatures must be carried out at working conditions for the purpose of a control and a precise rendering of test results. There are 4 figures, 1 table, and 4 references, 2 of which are Soviet.

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32-24-6-35/44

On Testing Armature Materials With Respect to Their Resistivity to Wear

ASSOCIATION: Vsesoyuznyy teplotekhnicheskii nauchno-issledovatel'skiy
institut im. F. E. Dzerzhinskogo
(All-Union Scientific Pyrometric Research Institute imeni
F. E. Dzerzhinskiy)

1. Armatures---Physical properties
2. Materials---Mechanical properties
3. Materials---Testing equipment
4. Materials---Test results

Card 3/3

Small fittings
ZHIRNOV, N.I., kand.tekhn.nauk; RATNER, A.V., kand.tekhn.nauk.

Small fittings for installations with very high steam parameters.
Elek.sta. 29 no.1:11-14 Ja '58. (MIRA 11:2)
(Boilers--Safety appliances)

SOV/129-59-3-7/16

AUTHORS: Ratner, A.V., Candidate of Technical Sciences and
Panicheva, A.S., Engineer

TITLE: Fastening Steel for Power-generating Equipment With
Steam Parameters of 140 atm, 570 °C (Krepezhnaya stal'
dlya energoustanovok s parametrami para 140 at., 570°)

PERIODICAL: Metallovedeniye i Termicheskaya Obrabotka Metallov,
1959, Nr 3, pp 28 - 32 (USSR)

ABSTRACT: Building of power-generating equipment intended to
operate with steam parameters of 140 atm, 570 °C.
brought about the necessity of developing pearlitic-
class steels for fastening components and spindles of
fittings; the housings and the covers of these fittings
are produced from the steel TsV-I, developed by
TsNII TMASH. The steel ^{used} for such purpose has a high yield
point at room temperature and at the operating tempera-
tures and ^{has} also a sufficiently high relaxation stability.
According to available experience, the residual stresses
in bolts after 10 000 hours at the operating temperature
should not be less than 10 kg/mm² in the case of
Card1/5 tensioning with an initial stress of 30-35 kg/mm², which

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Fastening Steel for Power-generating Equipment With Steam
Parameters of 140 atm, 570 °C

corresponds to a deformation of 0.15%. If the relaxation stability is lower, frequent tightening is necessary. The permissible specific pressure in the case of dry friction between the spindle and its guide should be not less than 3-3.5 kg/mm² and to achieve this, a thermochemical hardening of the surface has to be applied. The steels used at present for such components (in the Soviet Union) do not have an adequate relaxation stability and do not satisfy the specified requirements. The steel EI723, developed by TsNIITMASH(Ref 1) also does not have the required relaxation stability. In this paper, the results are described of investigations of the properties of a chromium-molybdenum steel, containing 0.2-0.25% C, 1% Cr, 1% Mo and 1% V, the aim of which was to elucidate whether this steel is suitable as a material for fastenings and spindles of fittings of power-generation equipment, operating with steam of 140 atm, 570 °C. In the experiments, 150 kg of steel was produced in a high-frequency furnace at the "Serp i Molot" Works.

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Parameters of 140 atm, 570 °C

The chemical composition of the produced steel, designated as 20Kh1M1F1 (EI909) is: 0.24% C, 0.36% Mn, 0.17% Si, 0.032% S, 0.019% P, 1.23% Cr, 1.01% Mo and 0.98% V. The tests were made mainly with the steel after hardening, followed by tempering; however, simultaneously, tests were also made with steel after normalisation annealing, followed by tempering. In Table 1, the hardness values and the structural composition of the steel after various heat treatments are listed. In Table 2, the results are listed of chemical analysis of the carbide precipitate. The mechanical properties of this and a few comparative steels after various heat treatments are entered in Table 3. A graph, p 31, shows the obtained relaxation data. The experiments also included nitriding and borating of the experimental steel (carried out by L.G. Leonova). Prior to nitriding, the steel was quenched in oil from 1 000 °C and then tempered for 4 hours at 700 °C. The thickness of the nitrided layer was below 0.01 mm and had a surface hardness of 1 300 kg/mm².

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With greater depth, up to 0.35-0.4 mm, the hardness dropped

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Fastening Steel for Power-generating Equipment with Steam
Parameters of 140 atm, 570 °C

to 800-600 kg/mm², whereby the hardness of the base metal was 322 kg/mm². Borating resulted in the formation of a diffusion layer, 0.25 - 0.3 mm deep, with a hardness of 1 700 - 1 900 kg/mm². On the basis of the obtained results, the following conclusions are arrived at.

1) After appropriate heat treatment, the tested experimental steel 20 Kh1M1Fl (EI909) has very favourable strength and relaxation properties at 565 - 570 °C and, consequently, it can be applied for joining elements of connections in power-generating equipment with steam parameters of up to 140 atm, 570 °C.

2) Ageing studies of this steel at 600 °C for 2 000 hours showed that the steel properties are sufficiently stable.

3) The tested 20Kh1M1Fl steel can be hardened by borating and nitriding and therefore can also be used for spindles and gland boxes of fittings operating with steam parameters up to 570 °C.

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Fastening Steel for Power-generating Equipment with Steam
Parameters of 140 atm, 570 °C

There are 1 figure, 4 tables and 4 references, 3 of
which are Soviet and 1 English.

ASSOCIATION: Vsesoyuznyy teplotekhnicheskii nauchno-issledovatel'skiy
institut (All-Union Thermotechnical Scientific-
research Institut)

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57544

SOV/96-60-1-13/22

18.7100

AUTHORS: Ratner, A. V., Candidate of Technical Sciences and
Leonova, L. G., Engineer

TITLE: An Investigation of the Behaviour of Nitrided Surfaces
in Fittings at High Temperatures γ^1

PERIODICAL: Teploenergetika, 1960, Nr 1, pp 59-63 (USSR)

ABSTRACT: Nitriding of pearlitic steels has been widely applied to valve parts operating at steam conditions up to 100 atm and 500°C. However, as some stations are adopting steam temperatures of up to 570 - 580°C, it is advisable to investigate the maximum temperature at which nitriding can be applied to pearlitic steel. The behaviour of a nitrided layer on pearlitic steel 38 KhMYuA was investigated at 550°C, this temperature being chosen because the parts in question operate at temperatures some 20 - 30°C lower than the steam temperature. Brief details are given of the preliminary cleaning procedure and of the heat-treatment applied during the two-stage nitriding process. The samples were aged at a temperature of 550°C for 1700 hours. After 1000 hours at 550°C the microstructure of the basic metal was not appreciably changed, but the

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structure of the nitrided layer had altered and the hardness was reduced. After 1700 hours ageing nitriding had penetrated to a depth of 0.81 mm; the hardness was still further reduced and was still falling after 10000 hours at 550°C. A graph of the change in surface hardness is plotted in Fig 2. The investigation showed that at a temperature of 550°C the nitrided layer is unstable and so nitriding should not be used to strengthen pearlitic steel parts operating at this temperature. Nitrided spindles of steel 38 KhMYuA on high-pressure valves at a power station in the Moscow system were tested for about 15000 hours at a steam temperature of 500°C and then for 2000 hours at a temperature of 525 - 530°C. The distribution of micro-hardness in the depth of the nitrided layer after operation at 525°C is plotted in Fig 3, and the results are discussed. It is concluded that although the micro-hardness of the nitrided layer tends to decrease at temperatures of 500 - 530°C it is still adequate at a depth of 0.2 mm after 2000 hours' operation, which is satisfactory for the parts in question. However, these

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spindles are subject to corrosion which is liable to reduce their reliability, and something needs to be done about this. Spindles of valves for super-high steam conditions are made of steel grade EI-69 nitrided at 540°C for 60 hours. Tests were made on specimens prepared in this way and on a spindle after 4000 hours' operation in a power station. The treatment of the steel before nitriding is described. The temperatures reached during nitriding are such that the layer is somewhat hard and brittle; and the data in Table 2 indicates that the transition from the nitrided layer to the basic metal is discontinuous. The tendency of the nitrided layer to brittle fracture was determined by scratching with a Vickers diamond, and the brittleness of the layer was found to be 2 - 3 units on the standard scale of brittleness. Nitriding of the steel increases its resistance to abrasion, but after the steel had been maintained at a temperature of 550°C for 1000 hours the resistance to abrasion was much reduced. It is concluded that low-temperature nitriding, as described,

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does not give a satisfactory result on austenitic steel grade EI-69. The Leningrad Metal Works uses a three-stage high-temperature nitriding process for austenitic steel grade EI-405 which has been found to give a reasonably uniform and comparatively deep nitrided layer. This steel can be used for valve spindles and other parts for super-high pressure steam. The nitriding process applied to the specimens is described. Measurements of micro-hardness within the depth of the nitrided layer in the initial condition and after ageing at temperatures of 550, 600, and 650°C are plotted in Fig 4. The mechanical properties of the nitrided layer were also assessed by bending tests. The change of surface hardness during ageing is plotted in Fig 5, and after 5000 - 10000 hours at a temperature of 650°C the surface hardness was appreciably reduced. But after ageing for 5000 hours at 550 - 660 - 650°C the nature of the change and the absolute value of the micro-hardness across the thickness of the layer remain similar to the initial condition: ✓

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the micro-hardness falls only slightly after further holding for 10000 hours. The resistance to corrosion of nitrided steel EI-405 appears to be satisfactory. It is concluded that nitrided spindles of austenitic steel grade EI-405 may be recommended for duty at temperatures of 600°C. There are 5 figures, 3 tables and 6 Soviet references. ✓

ASSOCIATION: Vsesoyuznyy teplotekhnicheskii institut (All-Union
Thermo-technical Institute)

Card 5/5

S/096/60/000/012/001/008
E194/E484

AUTHORS: Ratner, A.V., Candidate of Technical Sciences and
Leonova, L.G., Engineer

TITLE: The Selection of Materials for Wearing Parts of High
and Super-High Pressure Steam Fittings

PERIODICAL: Teploenergetika, 1960, No.12, pp.14-19

TEXT: With the regular use of steam conditions of up to 240 atm and 580°C, and with test turbines in existence for 300 atm and 650°C, it is very important to ensure reliability of wearing parts of fittings such as valve seatings, valve stems and screw threads. The requirements applicable to wearing parts of fittings for steam pressures of 240 to 300 atm are: absence of scoring during sliding with a pressure of at least 8 to 10 kg/mm² for sealing surfaces and not less than 4 kg/mm² for valve stem surfaces; resistance to corrosion and erosion comparable with that of austenitic chrome nickel steel; hardness not less than 40 Rc and absence of cracking in service. Currently available materials for fittings do not fully meet the above requirements. Nitriding has its limitations. Surface reinforcement with cobalt stellite is expensive, difficult

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E194/E484

The Selection of Materials for Wearing Parts of High and Super-High Pressure Steam Fittings

removed in service and, accordingly, this method of reinforcement is recommended only for valve stems of steels grades 3M-909 (EI-909) and 3M-723 (EI-723) operating at temperatures up to 565 to 580°C. Sulphiding of pearlitic steels is recommended for fitting parts which operate at temperatures up to 200 to 300°C without erosive wear. Sulphiding of chrome steels of types 3X13 (3Kh13) can be applied to parts subject to scoring and erosive wear in cases where, erosion conditions permitting, unreinforced steel grade 3Kh13 would normally be used. For valve stems operating at temperatures not above 510 to 540°C, nitriding may be used if there is no equipment for chromating. However, the nitrided layer has poor corrosion resistance in contact with asbestos and graphite asbestos glands. Electrolytic borating of pearlitic steels greatly increases the resistance to scoring and the hardness. However, the reinforced layer cracks after quite a short time, say 3000 hours at 550°C. Austenitic steels type 3M-17 (EYalt), 3M-69 (EI-69), 3M-572 (EI-572), 3M-405 (EI-405) and 3M-612 (EI-612) etc, and also

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The Selection of Materials for Wearing Parts of High and Super-High Pressure Steam Fittings

titanium have good erosion⁸ resistance but poor resistance to scoring and low hardness and are not recommended for valve seatings, valve stems, guide sleeves and other parts, they can only be used when there is no mutual dry friction at pressures above, for austenitic steels, 20 to 30 kg/cm² and for titanium, above 100 kg/cm². Austenitic steels type 18/8 may be made hard by nitriding but this reduces their resistance to erosion. Gas borating is a promising method of reinforcing austenitic steels, it increases the hardness and the resistance to scoring. Titanium and its alloys with aluminium may be reinforced by nitriding or oxidizing and though the resistance to erosion is reduced thereby, it remains fairly high and such parts may be used for certain applications up to 300°C. The most promising method of reinforcement for seating surfaces of valves operating at temperatures up to 580°C is the deposition of weld metal type TK-4 (TK-4)⁸ (14H-6 (TsN-6)⁸). For temperatures up to 650°C, use may be made of alloys similar to TsN-6 but with a higher content of

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silicon (alloys LM-7 (TsN-7)¹⁸ and LM-8 (TsN-8)¹⁸). Cobalt
stellite additionally alloyed with molybdenum (7 to 10%) and
alloys based on chromium carbide also gave satisfactory results at
these temperatures. On the basis of the work done it is
recommended to construct the wearing parts of high and super-high
pressure steam fittings with the materials and methods of
reinforcement given in Table 2. As a material for valve-sleeves,
bronze should be replaced by steel 38 XHMA (38KhMYuA)¹⁸ or
38X-3 (EZh-3)¹⁸ in the sulphided condition. There are 2 tables and
10 Soviet references.

ASSOCIATION: Vsesoyuznyy teplotekhnicheskiy institut
(All-Union Thermo-Technical Institute)

Card 5/5

RATNER, Abram Vladimirovich; ANTONOVICH, M.S., Eds.

[Steam pipe fittings for supercritical parameters] Arma-
tura dlia para sverkhkriticheskikh parametrov. Moskva,
Energia, 1965. 255 p. (MIRA 18:2)

L 20614-66 EWT(m)/EWP(w)/EWP(v)/I/EWP(t)/EWP(k) JD/HM/HW

ACC NR: AP6009809

(N)

SOURCE CODE: UR/0096/66/000/004/0014/0017

AUTHOR: Ratner, A. V. (Candidate of technical sciences); Berezina, T. G. (Engineer)

ORG: VTI, Chelyabenergo(CHENERGO)

TITLE: Effect of the welding thermal cycle on the formation of cracks in the weld-adjacent zone during welding of austenitic steel pipelines

SOURCE: Teploenergetika, no. 4, 1966, 14-17

TOPIC TAGS: austenitic steel, steel pipeline, pipeline welding, pipeline weld, weld cracking

ABSTRACT: During the welding of austenitic steel pipelines sharp temperature gradients and rapid heating and cooling are observed in the weld-adjacent zone, 5—6 mm wide. In a part of this zone the temperature reaches 1300C, a temperature at which some segregated inclusions begin to melt. This phenomenon is the main cause of ring-shaped cracks observed in welds of austenitic-steel pipelines. Electroslag-melted austenitic steels have a uniform distribution of alloying elements and are less susceptible to segregation than conventionally melted steels. Therefore, welded pipelines made of electroslag-melted-steel pipes are more reliable than those made of conventionally melted steel pipes. The reliability of the latter pipelines can be improved by reducing the sharp temperature gradients and minimizing welding

Cord 1/2

UDC: 621.643.411.4

L 70614-66

ACC NR. AP6009809

stresses and by full annealing of all welds. Orig. art. has: 6 figures and
2 tables.

[DV]

SUB CODE: 11, 13/ SUBM DATE: none/ ORIG REF: 007/ OTH REF: 002/ ATD PRESS:
4224

Card

2/2

BK

L 23197-66 EWT(d)/EWT(m)/EWP(w)/EWA(d)/EWP(v)/T/EWP(t)/EWP(k) LJP(c) JD/HM/EM
 ACC NR: AP6005891 SOURCE CODE: UR/0096/65/000/011/0067/0070 48
 46
 13
 AUTHOR: Ratner, A. V. (Candidate of technical sciences); Mazel', R. Ye.
 (Candidate of technical sciences); Leonova, L. G. (Candidate of technical
 sciences); Borovin, G. K. (Engineer).
 ORG: All-Union Heat Technology Institute (Vsesoyuznyy teplotekhnicheskii
institut)
 TITLE: Construction strength of welded joints made with high frequency
 currents 14
 SOURCE: Teploenergetika, no. 11, 1965, 67-70
 TOPIC TAGS: welding technology, high frequency
 ABSTRACT: Joints in tubes with a diameter of 25 x 3 mm, made of Steel
20A were used for the tests. The welding was done with high frequency
 currents as well as by the contact method. The high frequency welding
 was done under the following conditions: generator voltage-430 volts;
 power of generator-60 kilowatts; frequency-8,000 cycles. Shielding from
 oxidation was done with a gas consisting of 15% acetylene and 85% natural
 gas, fed at a rate of 1.5 liters/sec through the 25 x 3 mm tubes. Dur-
 ing the heating, there was a gap of 1 mm between the ends of the tubes,
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 Card 1/2 UDC: 621.632.411.4

L 23197-66

ACC NR: AP6005891

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through which the gas flowed and covered the surfaces being welded. Within a few seconds the gap closed and deposition began. The optimum heating temperature depends on the oxidation shielding medium and, at a specific deposition pressure of from 4 to 6 kgf/mm², is from 1250 to 1280°C (that is, lower than the melting temperature of the steel). In the tests for resistance to thermal shock, samples of the welded joints were heated in an electric furnace and suddenly quenched in water. The samples were subjected to a metallographic investigation after tests at 780, 1500, 5112, and 10,062 cycles. The vibration resistance of the welded tube joints was studied in a special unit designed for simultaneous evaluation of the effect on construction strength of cyclic vibrations, internal pressure, and elevated temperatures. Test results are exhibited graphically and in tabular form. The general conclusion of the article is that welding with high frequency currents shows promise in welding heating surface tubes made of low carbon steel. Orig. art. has: 8 figures and 1 table.

SUB CODE: 11, 13/ SUBM DATE: none.

Card 2/2 BK

ACC NR: AM6030784

(N)

Monograph

UR/

Ratner, Abram Vladimirovich; Zelenskiy, Vladimir Grigor'yevich

Erosion of the materials of thermal power plant equipment (Eroziya materialov teploenergeticheskogo oborudovaniya) Moscow, Izd-vo "Energiya", 1966. 270 p. illus., biblio; Errata slip inserted. 5200 copies printed.

TOPIC TAGS: power plant, thermal power plant, ~~material erosion, metal erosion, material wear, erosion damage prevention~~ wear resistance, power plant component, water vapor

PURPOSE AND COVERAGE: This book is intended for engineering personnel engaged in the fabrication and operation of thermal power-plant equipment. The book reviews damage to power plant parts caused by water, steam and gases moving at high speed. The effect of some technological, structural and operational factors on the rate of erosion of material is analyzed. Problems of erosion resistance of steels used in thermal power plants operating at high and superhigh parameters of steam are discussed. On the basis of experimental findings and operational experience, suggestions for reducing the material wear are made.

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SUB CODE: 13/

SUBM DATE: 08Feb66/

OTH REF: 019/

ORIG REF: 080/

Card 3/3

KATNEP, A.V., kand. tekhn. nauk

Testing of a model of steam inlet valves of the SV-100 turbine engine
factured by the Leningrad Machine-Building Plant. Energomashinostroenie
11 no.9:31-33 S '65. (MIRA 15-10)

RATNER, A.V., kand. tekhn. nauk

Heat stresses in steampipes and equipment during heating and
steam temperature fluctuations. Teploenergetika 12 no.8:42-46 Ag
'65. (MIRA 18:9)

1. Vsesoyuznyy nauchno-issledovatel'skiy teploekhnicheskiy institut
imeni Dzerzhinskogo.

RATNER, A.V., kand.tekhn.nauk; BUKRINSKIY, A.M., kand.tekhn.nauk

Calculation of cavitation modes in feed regulating fittings.
Teploenergetika 12 no.10:41-43 0 '65. (MIRA 18:10)

1. Vsesoyuznyy teplotekhnicheskiy institut.

RATNER, A.V., kand. tekhn. nauk; MAZEL', R.Ye., kand. tekhn. nauk; LEONOVA,
L.G., kand. tekhn. nauk; BOROVIN, G.K., inzh.

Design strength of joints welded by high-frequency currents.
Teploenergetika 12 no.11:67-70 N '65. (MIRA 18:10)

1. Vsesoyuznyy teplotekhnicheskiy institut.

GORELIK, B.M.; BUKHINA, M.F.; KRAYNOVA, L.A.; RATHER, A.V.

Studying the compression of round cross-section sealing rings
with lubricated surfaces. Kauch, 1 rez, 24 no.8:21-24 '65.

(MIRA 18:10)

1. Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti.

ZAKHEROV, Ye. G.; PALIKOVSKIY, N.V.; VIGANK, V.M.; RAINER, A.V.,
kand. tekhn. nauk, red.

[Experience in the installation and adjustment of steam-
pipes in blocks with 150 and 200 Mw. ratings] Iz opyta
montazha i naladki paroprovodov blokov moshchnost'iu 150
i 200 Mt. Moskva, Biuro tekhn. informatsii, 1964. 36 p.
(MIRA 18:5)

RATNER, A.V., kand. tekhn. nauk

Increase of the operational reliability of steampipes from austenitic
steel. Elek. sta. 36 no.6:34-40 Je '65. (MIRA 18:7)

RATNER, A.V., kand. tekhn. nauk; BEREZINA, T.G., inzh.

Residual stresses in the welded joints of pipelines from
austenitic steel. Teploenergetika 11 no.7:60-63 J1 '64.

(MIRA 17:8)

1. Vsesoyuznyy nauchno-issledovatel'skiy teploekhnicheskiy
institut i Chelyabenergo.

GORELIK, B.M.; RATNER, A.V.

Measurement of the pressure on the contact of compressed rubber rings with the bonded metal elements. Kauch. i rez. 22 no.7: 24-25 J1 '63. (MIRA 16:8)

1. Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti.
(Rubber goods---Testing)
(Packing (Mechanical engineering))

GORELIK, B.M.; BUKHINA, M.F.; KRAYNOVA, L.A.; RATNER, A.V.

Regularities of the transition from deformation in rubber rings or end-bound rubber cylinders to the axial strain of the cylinder. Kauch.i rez. 22 no.2:25-27 F '63. (MIRA 16:2)

1. Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti.
(Rubber--Testing)
(Strains and stresses)

RATNER, A.V., kand.tekhn.nauk; GURA, P.M., kand.tekhn.nauk; MAZEL', R.Ye.,
kand.tekhn.nauk

Causes of deformationless breakdown of the welded joints of steampipes
made from austentic steel. Teploenergetika 9 no.8:12-17 Ag '62.
(MIRA 15:7)

1. Vsesoyuznyy teplotekhnicheskii institut.
(Pipe, Steel) (Steampipes)

GORELIK, B.M.; RATNER, A.V.; BUKHINA, M.F.; KAPSHTYK, V.f.

Studying the testing butt joints and rubbers for asbestos cement water pipes. Kauch.i rez. 21 no.7:19-23 J1 '62. (MIRA 15:7)

1. Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti.
(Water pipes) (Rubber goods)

GORELIK, E.M.; RATNER, A.V.

Objective measurement of rubber hardness. Kauch.i rez. 21
no.3:41-43 Mr '62. (MIRA 15:4)

1. Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti.
(Rubber--Testing) (Hardness--Measurement)

IMBRITSKIY, Matvey Iosifovich; RATHER, A.V., red.; DUB, B.I., red.;
BORUNOV, N.I., tekhn. red.

[Brief handbook on pipelines and fittings]Kratkii spravochnik
po truboprovodam i armature. Moskva, Gosenergoizdat, 1962.
271 p. (MIRA 15:9)

(Pipe fitting)

LAGUNTSOV, I.N., kand. tekhn. nauk; RATNER, A.V., kand. tekhn. nauk;
ZELENSKIY, V.G., inzh.

Causes of the rapid wear of the parts of high-pressure feed subjected to flow passage impact and selection of materials for their manufacture. Teploenergetika 7 no.11:55-59 N '60. (MIRA 14:9)

1. Vsesoyuznyy teplotekhnicheskiy institut.
(Pumping machinery) (Corrosion resistant materials)

RATNER, A.V., kand.tekhn.nauk; ARISTOV, M.Ya., inzh.

Designing super-high pressure steam pipes for strength.
Teploenergetika 7 no.9:44-49 S 160. (MIRA 14:9)

1. Vsesoyuznyy teplotekhnicheskiy institut.
(Steampipes)

RATNER, A.V., kand.tekhn.nauk; KAGAN, D.Ya., kand.tekhn.nauk

Investigating the corrosivity of packings. Teploenergetika 8
no.5:35-39 My '61. (MIRA 14:8)

1. Vsesoyuznyy teplotekhnicheskiy institut.
(Packing (Mechanical engineering))
(Steel--Corrosion)

RATNER, A.V., kand.tekhn.nauk; LEONOVA, L.G., inzh.

Possibility of applying the sulfide treatment to fittings.
Teploenergetika 8 no.11:51-52 N '61. (MIRA 14:10)

1. Vsesoyuznyy teplotekhnicheskiy institut.
(Steel) (Surface hardening)

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S/138/62/000/003/006/006
A051/A126

16.430°

AUTHORS: Gorelik, B.M., Ratner, A.V.

TITLE: Objective measurement of rubber hardness

PERIODICAL: Kauchuk i rezina, no. 3, 1962, 41 - 43

TEXT: The TM-2-19 (TM-2-19) instrument has been designed for objective measurement of rubber hardness under constant load, using the TM-2 measuring device. The instrument reduces the index variability, simplifies and speeds up the measurement of hardness. The shape of the sample does not affect the accuracy of the instrument readings. The inherent disadvantages of the TM-2 measuring device are given as being: lack of objectivity of the hardness index measured with this device, since its value depends on the qualifications of the technicians; inability to measure small-sized rubber articles; too much variation in the hardness indices obtained. The TM-2-19 combines the advantages of the TM-2 and eliminates its shortcomings. The set-up of the instrument (Fig. 1) is checked along a smooth metal surface (8). The instrument is centered according to platform (9) prior to measuring the hardness, on rings or cylinders. By moving the inserted disk (4) and turning the cantilever (6), the needle of the

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instrument coincides with the aperture in platform (9), under depression of the handle (3). Depending on the shape of the sample, it is placed either on (8), (10) or (11) platform. By slow depression of the handle (3), the platform with the testing sample is elevated to the starting point of the load elevation, then the submersion depth of the needle is measured, counting the indications on the scale, given in relative units. When using the TM-2-19 instrument, the submersion depth of the needle is measured at the beginning of the load elevation, i.e., under constant pressure. Thus, the hardness measurement is objective. The new design has been introduced at the NIIRP laboratories, at the "Kauchuk" Plant, and the Orenburg Reclaiming Plant. There are 2 figures, 2 tables and 6 references: 3 Soviet-bloc and 3 non-Soviet-bloc. The reference to the most recent English-language publication reads as follows: 6) Rubb. Age, 81, No. 4, 687 (1957).

ASSOCIATION: Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti
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34395
S/695/61/000/000/001/005
B:39/B:04

18.1151

AUTHORS: Gura, P. M., Laguntsov, I. N., Ratner, A. V.
TITLE: Experience with austenitic boiler plate steels
SOURCE: Gorshkov, A. S., V. Ye. Doroshchuk, and N. V. Kuznetsov, eds.
Povysheniye parametrov para i moshchnosti agregatov v
teploenergetike; sbornik statey Moscow, Gosenergoizdat
1961. 92 - 103

TEXT: The authors compile the experience made with steam lines and
superheaters from austenitic steels (Table 1). Experiments were con-
ducted: (1) on a steam boiler of the TETs VTII at 300 at and 600°C.
The bends of the superheater tubes showed no defects after 40,000 opera-
tional hrs. Intercrystalline cracks developed at various welded joints of
the steam lines. The structure of the ЭМ-257 (EI-257) steel which was
used greatly changed after extended effect of the operational tempera-
ture. The molybdenum and chromium content in the carbides increases
with the time. Formation of α - and σ -phases and deterioration of the
mechanical properties occur. (2) Experiments on superheater tubes in the

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Experience with austenitic boiler

boilers of the pervaya promyshlennaya GRES (First Industrial GRES). Steam temperature at the exit of the third stage is 565 - 570°C. Tubes from EI-257 steel, in one case from 1X18H12T (1Kh18N12T) steel, length of test for EI-257 37000 hrs, for 1Kh18N12T 15000 hrs. A carbide phase was formed and chromium and partially molybdenum passed from the solid solution into the carbides. The test of the welded joints at 600°C showed that their fatigue strength is the same at 100,000 hrs as that of the basic material ($\sigma_f = 12 \text{ kg/mm}^2$). At the welded seams, cracks occasionally occur which may be traced to imperfect welding methods. In order to determine the weldability, the contraction of the test rods after heating to 1260°C must be determined. Moreover, the welding technology must be improved. There are 10 figures and 3 tables.

Table 1. Chemical composition and heat stability of the steels investigated. Legend: (1) brand of steel; (2) use; (3) chemical composition in %; (4) resistance to heat; (5) yield point σ_y , kg/mm² at C = 1% for 100,000 hrs; (6) fatigue strength σ_f at 100,000 hrs; (7) superheater tubes, steam lines; (8) steam superheater tubes, steam lines.

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Material of the main components and ...

boron treatment and sulfidizing produce no increased erosion stability of these steels. The author describes the steel types suitable at various steam parameter for the spindles and sealing surfaces of the fittings. Design characteristics of high-pressure fittings are also dealt with: conic seals are mainly used for valves of up to 30 mm diameter, flat seals, too, for greater diameters. Spindles and valve discs are often made in one piece and the seat is welded directly into the housing. In valves for low temperatures and high pressures, syphon seals are often used instead of glands; high-pressure gate valves are often fitted with twin-disc breechblocks; lately, gate valves with elastic breechblock made in one piece with deep recess, and, as a space saving fitting, single-disc gate valves for temperatures of up to 650°C and pressures up to 300 at have also been used. For spring safety valves, rigid springs are used which develop much higher pressure at full stroke than in closed position. Impulse safety installations are increasingly used as well as combinations of spring- and impulse valves. There are 11 figures and 1 table.

Table 1. Steel types used in the main components of fittings for high

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Material of the main components and ...

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and supercritical pressures. Legend: (1) steel types for the individual parts; (2) steam and water parameters; (3) housing and lid; (4) mounting parts (pins); (5) screws; (6) spindles; (7) gaskets; (8) inner parts (working frictionless); (9) feeder fittings and saturated steam fittings for high and supercritical pressures; (10) and armco iron; (11) steam 100 at and 510°C (530-540°C); (12) and iron; (13) steam 140 at and 570°C; 240 at and 580°C; (14) steam 230 at and 610°C; (15) (casting); (16) steam 300 at and 650°C; (17) ЭИ-695Р (EI-695R) (forging) ЦЖ-7М (TsZh-7M), ЭИ-402М (EI-402M) (casting).

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RATNER, A.V., kand.tekhn.nauk; LEONOVA, L.G., inzh.

Concerning the choice of materials for parts which are subject
to wear in equipment with high and superhigh pressures.

Teploenergetika 7 no. 12:14-18 D '60.

(MIRA 14:1)

1. Vsesoyuznyy teplotekhnicheskii institut.
(Boilers) (Steam turbines)

GORELIK, B.M.; BUKHINA, M.F.; KAPSNTYK, V.I.; RATNER, A.V.; MAYOROVA, A.S.

Rubber sealing rings. Standartizatsiia 25 no.3:49-50 Mr '61.
(MIRA 14:3)

(Gaskets—Standards)

RATNER, A.M.; ZIL'BERMAN, G.Ye.

Theory of luminescence of activated phosphors. Izv. AN SSSR
fiz. 25 no.4:537-538 Ap '61. (MIRA 14:4)
(Phosphors)

GORELIK, B.M.; BUKHINA, M.F.; RATNER, A.V.; Prinimali uchastiye: VASIL'YEV,
O.B.; KOROLEVA, V.M.

Change of contact area during the deformation of rubber cylinders and
rings. Kauch. i rez. 20 no.1:12-17 Ja '61. (MIRA 14:3)

1. Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti.
(Rubber goods--Testing)
(Deformations (Mechanics))

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S/138/61/000/001/004/010
A051/A029

11.2314

AUTHORS: Gorelik, B. M., Bukhina, M. F., Ratner, A. V.

TITLE: The Change in the Contact Area in Deformation of Rubber Cylinders and Rings

PERIODICAL: Kauchuk i rezina, 1961, No. 1, pp. 12-17

TEXT: The dependence of the contact area of rings and cylindrical samples on the degree of compression was studied. The contact area of circular cross-section rings under conditions of axial compression and cylindrical samples under conditions of axial and radial compression within the limits of 5 to 80 % deformation was determined. The contact area did not depend on the hardness of the rubber. In cylindrical samples deformed in axial direction it is close to the values of the area of the true cross-section calculated from the condition of constant volume. The greatest difference between them (up to 20 %) was noted in compressions from 30 - 60 %, since the "barrel-shape" of the samples is at a maximum in these deformations. The data on the contact area were obtained by measuring the chalk marks left by the ring in axial deformation (Fig. 1, b) or by the cylindrical

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The Change in the Contact Area in Deformation of Rubber Cylinders and Rings sample (Fig. 1, c, d, e) on the compressed steel plates processed to ∇^7 . The relative contact area S^* was determined from the formula:

$$S^* = \frac{S_K}{S_0},$$

where S_K is the true contact area, S_0 is the initial area of the bearing surface for cylindrical samples deformed in the axial direction, or the area of the maximum longitudinal section for cylindrical samples deformed in the radial direction, and for rings. The degree of compression ξ for samples loaded according to diagram e was determined in the usual way and in all the other cases according to the change of the section diameter:

$$\xi = \frac{d_0 - h}{d_0},$$

where d_0 is the diameter of the section of the cylindrical sample or ring before deformation, h is the height of the cylindrical sample or ring in the deformed state. The relative change in the contact area for the rings under conditions of axial compression and cylindrical samples (free and limited at the ends) under conditions of radial compression is found to be the same. In

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The Change in the Contact Area in Deformation of Rubber Cylinders and Rings

order to calculate the true value of the section area of the samples under compression in the absence of friction at the ends the following ratio based on the constant volume condition of the rubber in deformation is used:

$$\frac{S_{true}}{S_0} = \frac{1}{1 - \epsilon} \quad (1).$$

Figure 3 shows the relationship of the relative area of contact to the degree of compression for samples compressed in the axial direction. Figure 4 shows that within the limits of accuracy of the experiment the curves of the relationship of the relative contact area to the degree of compression for rings and samples coincide for diagrams b, c and d. For samples deformed according to diagram d (Fig. 1) the width of the contact changes linearly with in the limits of the ϵ change from 0.05 to 0.8 with an accuracy of 5% and is described by the empirical formula:

$$\frac{d}{d_0} = 2\epsilon + 0.15 \quad (2),$$

where d is the width of the contact of the deformed sample, d₀ is the initial diameter of the sample. Experiments showed that equation (2) was true

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The Change in the Contact Area in Deformation of Rubber Cylinders and Rings only for $\epsilon \geq 0.05$. Figure 5 shows that equation (2) is valid for deformations of b and c at an ϵ change from 0.05 to 0.4. For $\epsilon > 0.4$ the empirical formula would be:

$$\frac{d}{d_0} = (2\epsilon + 0.15)^2 \quad (3).$$

No change in the length of the contact up to $\epsilon = 0.4$ takes place, after which it corresponds to the formula

$$\frac{l}{l_0} = 2\epsilon + 0.15, \text{ for } \epsilon > 0.4 \quad (4),$$

where l is the length of the contact surface of the deformed sample, l_0 is the length of the non-deformed sample. Since at $\epsilon < 0.4$ the length of the contact is considered constant in all of the diagrams, the change in the contact area in deformation is described by the same equation as the change in the contact width:

$$S^* = \frac{S_K}{S_0} = 2\epsilon + 0.15, \text{ for } 0.05 < \epsilon < 0.4 \quad (5).$$

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The Change in the Contact Area in Deformation of Rubber Cylinders and Rings
From formulae (2) and (4) for the length and width of the contact of the sample compressed according to diagram d an expression for describing the contact area is derived:

$$S^* = (2\epsilon + 0.15)^2, \text{ for } \epsilon > 0.4 \quad (6).$$

Figure 6 shows that the side surface of a compressed sample cannot be regarded in the same way as the surface of a circular cylinder when measuring the width of the sample (d_1) in deformation according to the load of diagram d. The values of the area of the transverse section and the volumes of a sample were calculated at different degrees of compression, resulting in a confirmation of the constancy of the volume. The authors point out that an accurate theoretical calculation of the relationship of the contact area and the shape of the side surface to the degree of compression under conditions of complex tension would be possible only when solving a three-dimensional problem for end deformations. There are 4 graphs, 1 diagram, 1 table, 1 photograph and 5 Soviet references. ✓

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The Change in the Contact Area in Deformation of Rubber Cylinders and Rings

Table: Values of the area of the transverse section and volume of a sample calculated at different degrees of compression

degree of compression, %	area of transverse section cm ²	volume, cm ³
0	0.78	0.78
0.1	0.78	0.78
0.2	0.80	0.80
0.3	0.77	0.77
0.4	0.72	0.76
0.5	0.65	0.76
0.6	0.57	0.77
0.7	0.49	0.77
0.8	0.38	0.69

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The Change in the Contact Area in Deformation of Rubber Cylinders and Rings

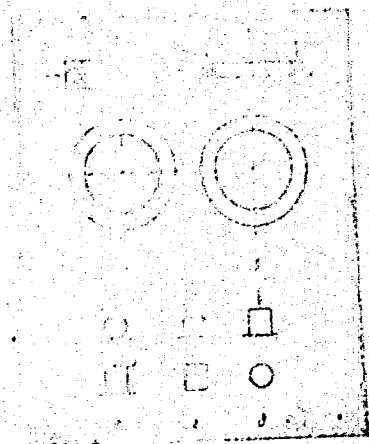


Figure 1:

Diagram of load on rubber rings and samples:

- a) radial load of the ring,
- b) axial load of the ring,
- c) radial load of the cylindrical sample restricted at the ends,
- d) radial load of the cylindrical sample (not restricted),
- e) axial load of the cylindrical sample

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